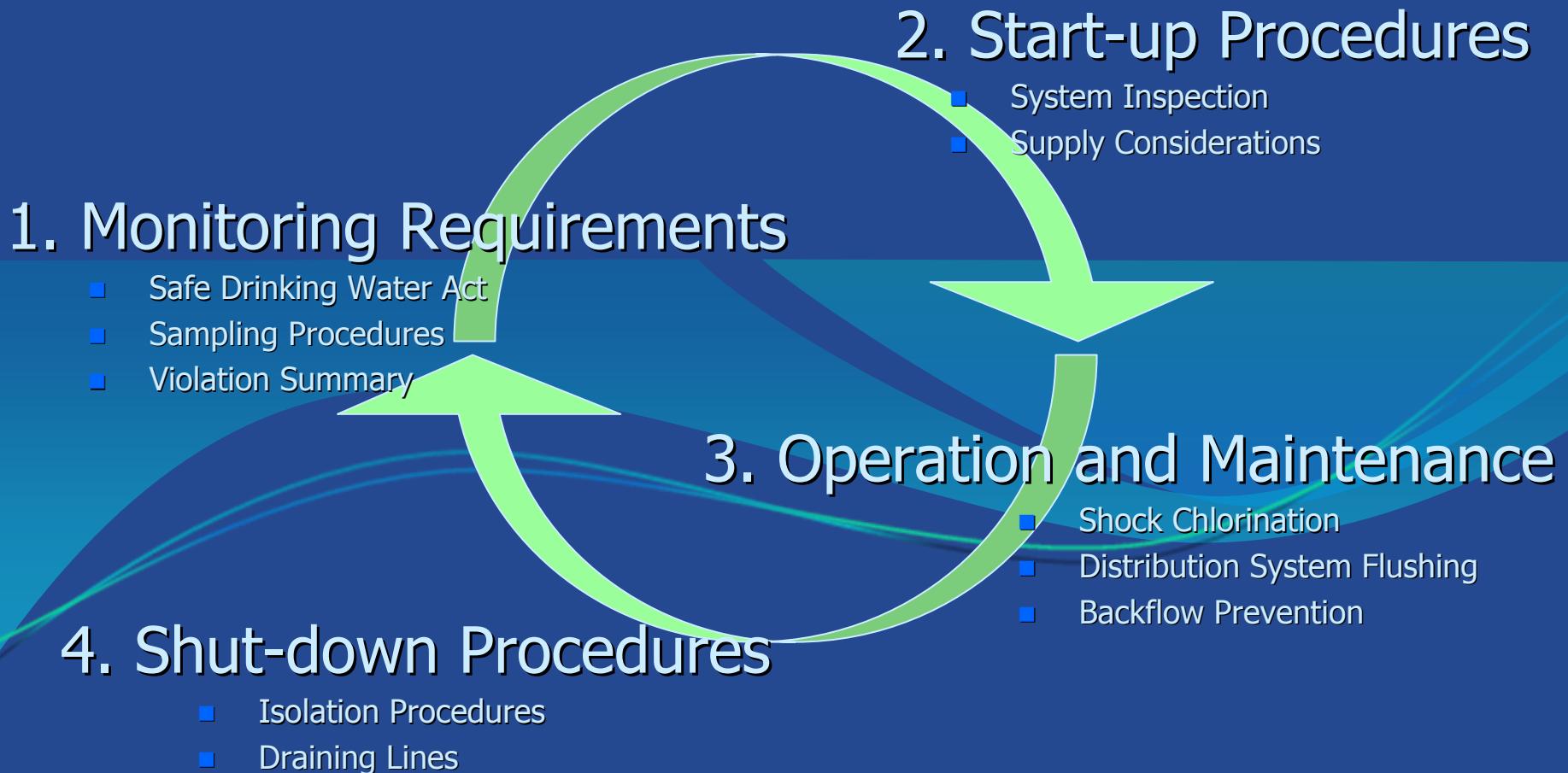


Water System Operation, Maintenance and Inspection

April 8, 2009 ~ Concord, NH

Presented by NH Department of Environmental Services and
Granite State Rural Water Association

Presentation Goals



Safe Drinking Water Act



source: <http://www.epa.gov/OGWDW/sdwa>

- Public Water System
- Sampling
- Reporting
- Public Notification
- Violations



Monitoring Requirements

■ Monitoring

- Total Coliform Rule (Quarterly)
 - If seasonal, take samples before opening each year
- Nitrate/Nitrite (Annually/Triennial)
 - More frequently if required by DES
- Ground Water Rule (Investigative/Triggered)



Total Coliform Rule

When the early microbiologists looked into their microscope, do you know what they found?



- Total Coliform (Bacteria)
- *E. coli*
 - Source: Intestines of warm-blooded animals
- Health Risk - gastrointestinal



Total Coliform Rule

■ About the Current Rule:

- Monitor for the presence of total coliforms in the distribution system.
- Used to determine the adequacy of water treatment and the integrity of the distribution system.
- Covers; Sampling frequency, issuance of violations, boil orders and public notice requirements.



Nitrite / Nitrate Sampling

- Inorganic chemical
 - Source: fertilizer, sewage, animal waste
- Health risk – methemoglobinemia
- 40 mL sample container



Ground Water Rule

- Source sampling for *E. coli*
- Investigative monitoring
 - Systems that disinfect
- Triggered monitoring – December 09
 - All groundwater systems

*Emphasis on proper sampling technique



Sampling Overview

- Frequency: Quarterly (When open)
- Sample beginning of the month, early in the week
- Taken from site in distribution system



Source: NBC news

- Should not be on fire!



Repeat Samples

TCR: Four repeat samples are required w/in 24 hours

What if I only have one site to sample from?



3

Original nit
site



4

Other/Source
Recommended



Source

DES Website

A A A

an official NEW HAMPSHIRE government website



PUBLIC GOVERNMENT BUSINESS A to Z LIST

[DES Home](#)
[About DES](#)
[Media Center](#)
[Public](#)
[Government](#)
[Business](#)
[Programs](#)
[Rules/Regulatory](#)
[Contact Us](#)
[Site Map](#)

One Stop Data and Information

ALERTS
Drinking Water Advisory

SUBSCRIBE
e-news

[Divisions > Water Division > Programs/Bureaus/Units > Drinking Water and Groundwater Bureau >](#)

Drinking Water and Groundwater Bureau



The New Hampshire Department of Environmental Services (NHDES) was created in early 1987 as a result of legislative efforts to reorganize several previously separate agencies dealing with environmental matters into a single, coordinated agency. Within NHDES, there are three divisions which deal with air resources, waste management, and water resources. This last unit, the Water Division (WD), includes several bureaus, one of which is the DWGB. Other bureaus within the Water Division deal with surface water pollution, wastewater treatment, groundwater protection, stream and lake biology, and water resources management. The work of the Waste Management Division may also have an effect on water quality in more subtle, but no less important ways. The agency addresses many varying aspects of protection of surface water and groundwater supplies. [more...](#)

Hot Topics

- [Accredited Laboratories for Drinking Water Analyses](#)
- [NHDES Laboratory Sample Bottle Orders](#)
- [Radionuclides Compliance Help](#)
- [Stimulus Package for Environmental / Water Infrastructure](#)

Publications (Complete List)

- [Annual Compliance Reports](#)
- [Accredited Radiochemistry Laboratories](#)
- [Analytical Requirements for Community Public Water Systems](#)
- [Fact Sheets](#)

search DES

DWG Bureau

- Program Home
- Overview
- Hot Topics
- Publications
- Rules/Regulatory
- Education/Outreach
- Technical Assistance
- Training
- Forms/Applications
- Permits
- Grants/Loans
- Related Programs
- Partnerships
- Resources/Links
- FAQs
- Contact Us

Water Division

- Water Home
- Division Overview
- Programs/Bureaus/Units
- Rules/Regulatory
- Publications

The Department



OneStop

NHDES homepage <http://des.nh.gov>

OneStop logo

Data Retrieval Site link

Public Water System link

OneStop Environmental Site Information

- [OneStop Master Site table](#)
- [Air Stationary Sources](#)
- [Hazardous Waste Generators](#)
- [Aboveground Storage Tank Sites](#)
- [Groundwater Permit Sites](#)
- [Inactive Asbestos Disposal Sites](#)
- [Remediation and Initial Response Spill Sites](#)
- [Underground Storage Tank Sites](#)
- [Vapor Recovery Sites](#)
- [Solid Waste Sites](#)
- [Web Geographic Information System](#)
- [Public Water System](#)
- [Bottled Water Sites](#)
- [Environmental Monitoring Data \(IE 5.5 or above only\)](#)

OneStop Project-Specific Information

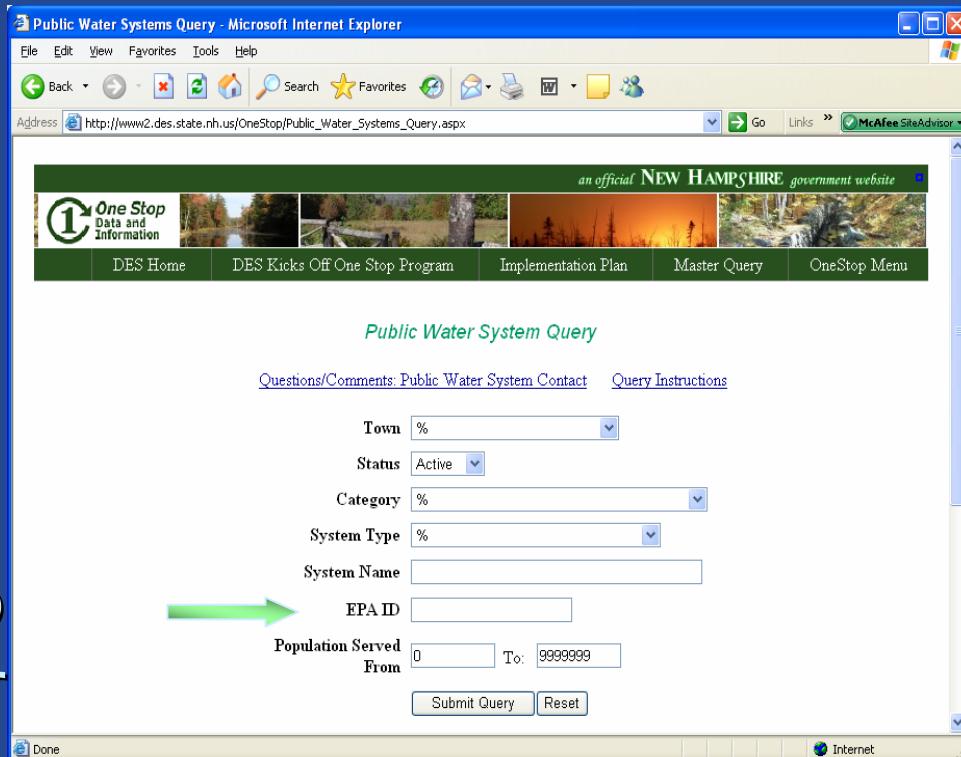
- [Homeowner Sampling Container Request](#)
- [Household Hazardous Waste Contractors](#)
- [Public Water Systems Contacts Excel Output](#)
- [Sampling Container Request](#)
- [Shoreland Protection Waterbodies](#)
- [Waste Management Division Activity Reports and Service Provider Listings](#)
- [Alteration of Terrain Permits Subsurface Bureau Reports & Excel Output](#)
- [Surface Water Quality Report Cards](#)
- [Water Wells](#)
- [Water Well Contractors Watershed Assistance Grants](#)



OneStop Website

http://www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx

Enter the EPA ID number



Public Water Systems Query - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www2.des.state.nh.us/OneStop/Public_Water_Systems_Query.aspx

an official NEW HAMPSHIRE government website

DES Home DES Kicks Off One Stop Program Implementation Plan Master Query OneStop Menu

Public Water System Query

Questions/Comments: Public Water System Contact Query Instructions

Town %

Status Active

Category %

System Type %

System Name

EPA ID

Population Served
From 0 To: 9999999

Submit Query Reset



OneStop Website

Public Water System Query Results - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Favorites Address http://www2.des.state.nh.us/OneStop/Public_Water_Systems_Results.aspx?Town=%&Category=%&SystemType=%&Pr Go Links >> McAfee SiteAdvisor

an official NEW HAMPSHIRE government website

DES Home DES Kicks Off One Stop Program Implementation Plan Master Query OneStop Menu

Public Water Systems Query Results

Questions/Comments: Public Water System Contact Container Request for Public Water Systems Water Supply Engineering Bureau Homepage

EPA ID	Site Name & Location Address	Reports	Type	Category	Status	Population Served	Service Connections
			COMMUNITY	CONDOMINIUMS	ACTIVE Date: 01-1970	55	22

1
[Prev](#) [Next](#)

[Printable Version in Excel](#) [Printable Version Help](#)

Total Records Returned: 1
[Return to Query](#)

New Hampshire Department of Environmental Services | PO Box 95 | 29 Hazen Drive | Concord, NH 03302-0095

Done Internet



Drinking Water and Groundwater Bureau Master Sampling Schedule

September 23, 2008
Page 1 of 3

EPA ID: -----

System Type:

Questions? Please call (603) 271-3544.

SURFACE WATER MONITORING REQUIRED

Monthly Operating Report for Filtered Surface Water System

Number of Surface Water Sources: 1

Status: FILTERED (SWTR)

Questions? Please call (603) 271-2948 or (603) 271-2953.

BACTERIA Sampling Month: MONTHLY

[Routine Analysis Request Form](#)

[Multi-Use Form \(Multiple-routines, Repeats, Make-Ups\)](#)

This schedule reflects

routine sampling -

additional samples

required following a

positive bacteria result.

Sample

Site Number(s)

Sample Site(s)

00

38 GREEN HILL RD HAYES RES

- 1 Routine sample(s) per sampling month
- 4 Repeat samples for each positive routine
- 5 Routine samples the month following a positive routine sample

Questions? Please call (603) 271-2542.

LEAD AND COPPER

Compliance Begin Date: 01/01/2005

Monitoring Frequency: Triennial

Sample In Quarter: Q4-Oct-Dec

Round: 08

[Analysis Request Form](#)

[Initial WQ Parameters Form](#)

This schedule will not reflect partial samples taken.

Site Activity

Sample Site Number(s)

Sample Site(s)

Minimum Sites Required: 10

Samples Required: 5

Active	001	TOWN OFFICE BLDG
Active	003	RT 16 /R POIRIER
Active	005	WENTWORTH CONDOS UNIT 8B
Active	011	GREEN HILL RD /HAYES
Active	013	RT 16 /P DONNELLY
Active	015	RT 16 /HILL
Inactive	007	DINSMORE RD /H LEE
Inactive	009	THORN MT RD /R SPOSATO

Inactive sites are temporarily vacant, or where current resident wishes not to participate.
Please advise this office of site status changes. Questions? Please call (603) 271-2516.

Note: This schedule is effective as of: 09/23/2008. DES recommends that you review your master sampling schedule on a regular basis to ensure that you have the most recent schedule before you collect your samples.

Schedule

Access Analysis Request forms,
sample schedule, site locations, and contact information.



Sample Form



Drinking Water and Groundwater Bureau
Analysis Request Form

BACTERIA (Total Coliform Rule)
Compliance Sample Site(s) per Master Sampling Schedule

October 27, 2007
Page 1 of 2

EPA ID:

Collected By: _____
(Print Name)

System Name:

Signature: _____

I certify that all samples taken are from the sites listed below and all information provided on this form is true to the best of my knowledge.

PWS Town:

Phone Number: _____

Sample Category: Routine Make-up Results for the Month of: _____ Year: _____

Are Sample(s) Chlorinated? Yes No

Site ID	Sample Site Location	Date & Time Sample Taken	Free Chlorine Residual (mg/L)	Lab Sample ID #	Date & Time Sample Was Processed	Total Coliform Count P or A	Non-Coliform Count	Fecal Coliform or E. coli P or A
001	SAMPLE STATION O							

According to DE3 records, this system CHLORINATES. Free chlorine residual concentrations must be measured and recorded at the time of sample collection. If CHLORINATION is not in use, please contact DE3 DWGB to update the appropriate records by email DWGBInfo@dec.state.nh.us or by calling 271-2960/271-3544.

Laboratory Name Responsible for Analysis: _____

Laboratory Cert. ID#: _____

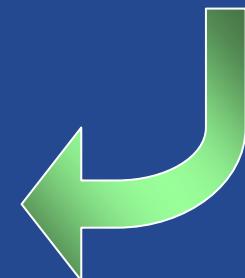
Laboratory Phone #: _____

Received at Laboratory by: _____

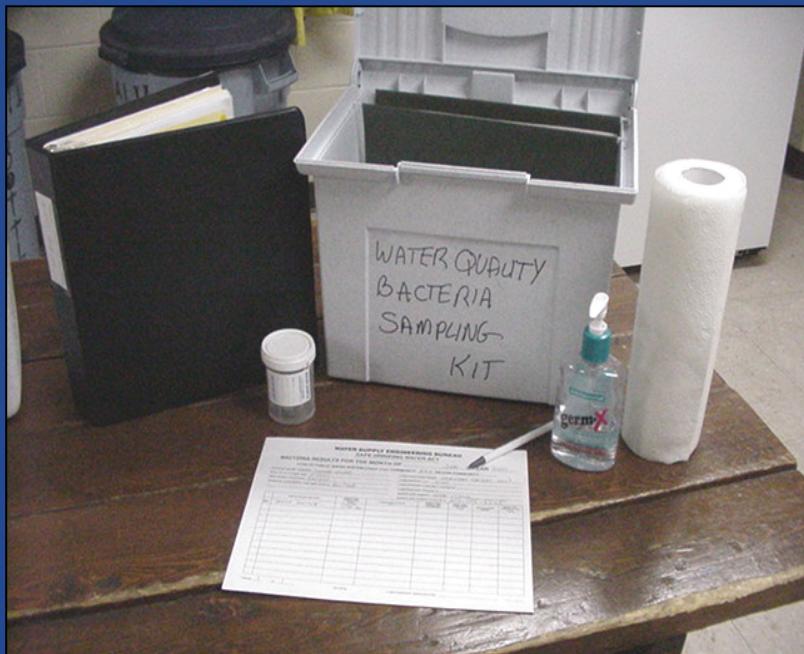
START



Bacteria Sampling



Reporting



- Pre-printed forms
- Fill out correctly and completely
- It is *your* responsibility to send results to DES
- Some private labs will do this by contract
- *Electronic transfer coming

What Do the Results Mean?

- Total Coliform absent/present
- Repeat samples
- *E. coli* present
- Violations
- Public notice



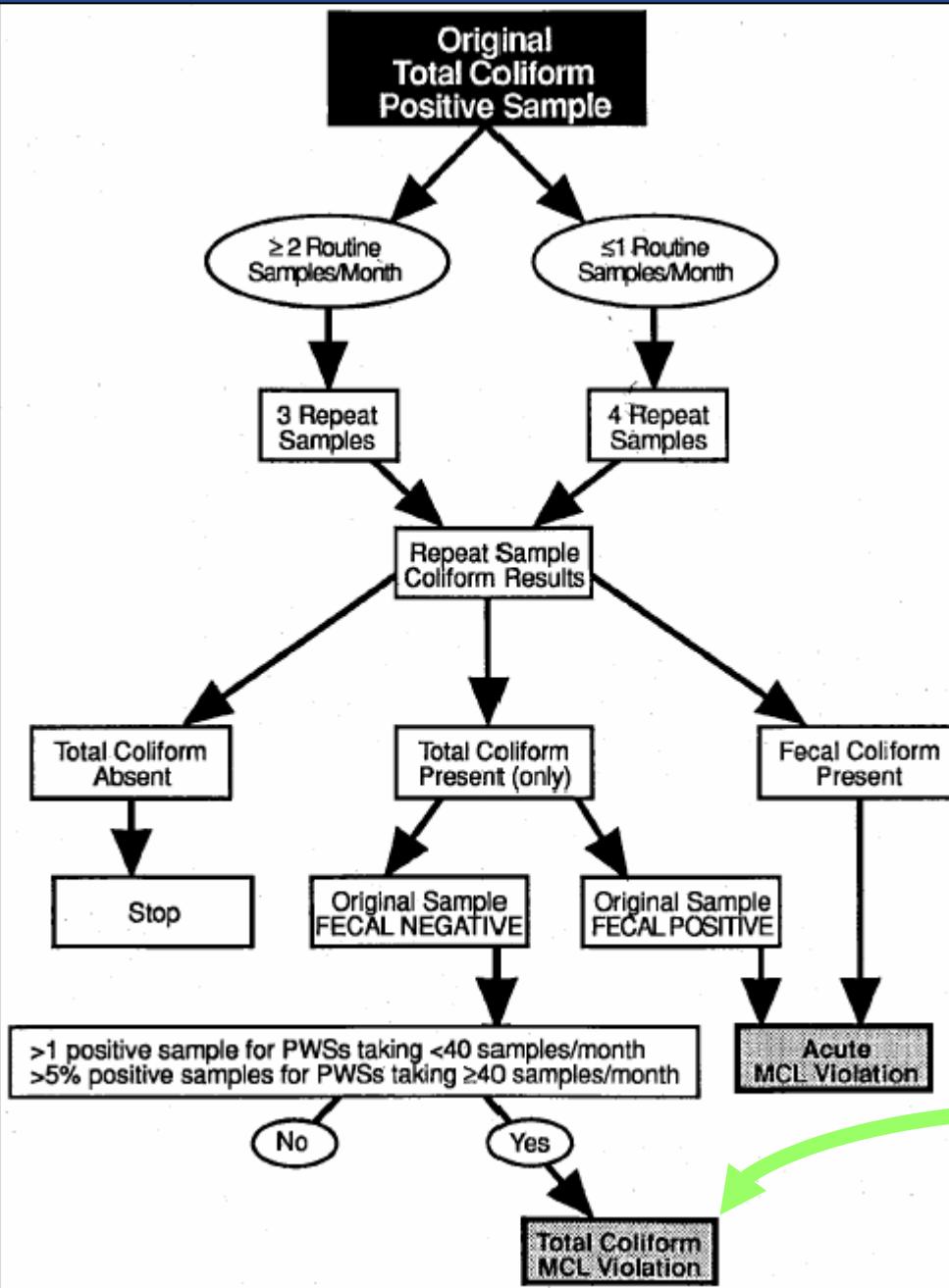
Violations

- Maximum Contaminant Level:
 - Bacteria in more than one sample collected
- Monitoring and Reporting:
- Public Notice:
 - Standard and acute notices

**Tracked by EPA, DES may issue further enforcement.

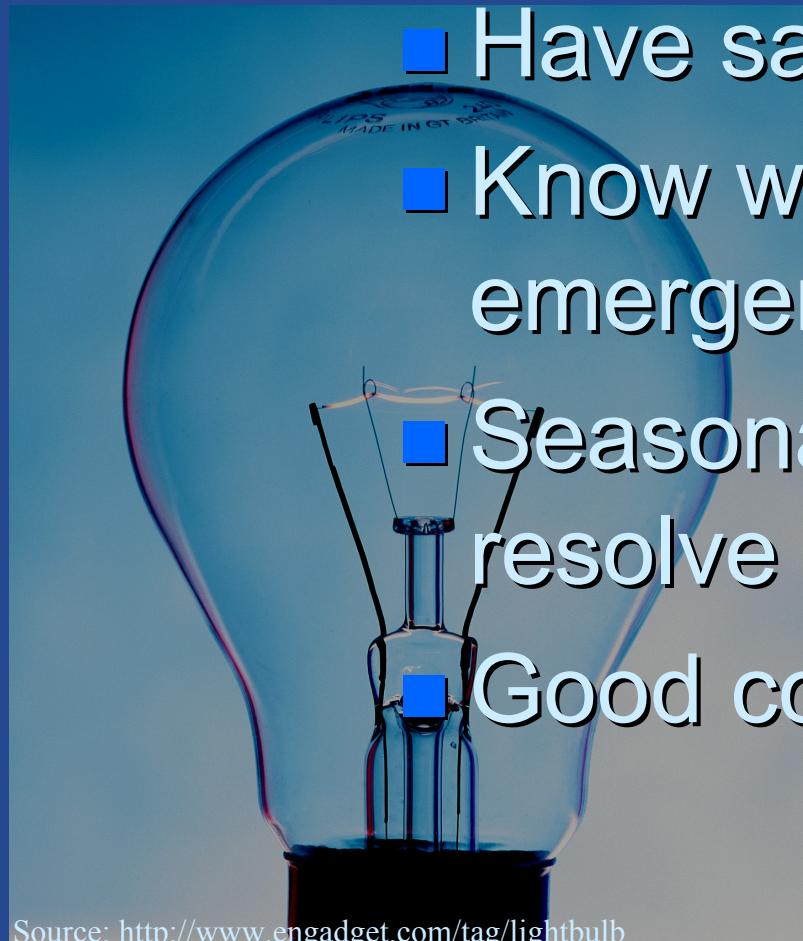


Determining When the MCL is Exceeded.



Other Things to Consider

- Have sample bottles on-hand
- Know what to do in an emergency
- Seasonal systems should resolve issues prior to close
- Good communication is key



Source: <http://www.engadget.com/tag/lightbulb>



Contact:

Adam Torrey

NH. Dept. of Environmental Services

Phone: (603) 271-0672

Email: adam.torrey@des.nh.gov

Website: www.des.nh.gov



Maintenance Spring Start Up

- Inspection procedure.
- Important to check integrity of all system components.
- Very important to have sanitary conditions.



Start Up Inspection

- Has frost action affected component.
- Is component in good condition?
- If area around source is plowed has the source or storage component been hit or damaged by plow?



Bringing System into Service

- If water has been stagnant, it is more likely to hold bacteria and needs to be flushed including all components and the distribution system.
(Flushing is key)
- Record any procedures for future reference (SOP) in your O&M Manual
- Should perform disinfection procedure.
- Contact <http://www.GSRWA.com> for help with this.



Flushing Distribution System

- Trying to displace all the stagnant water
- Trying to Scour the insides of the pipe lines.
- Prepares the system for chlorination.
- Should also be done after all repairs.



Flushing Source and Storage

- For dug wells open cover and perform “scrub down” procedure (pressure washer works well).
- Remove any sediment.



Maintenance Tips

- Plug cracks, holes, etc. in casing and storage
- Disinfect annually at start up and shut down
- Prevent and repair leaks quickly, always chlorinate and flush.
- Maintain positive pressure in distribution system
- Be aware of surroundings, protect your source. (no parking)
- Monitor flow rates (meter source)



O&M Manual

- System Description
 - Wells
 - Storage
 - Distribution
 - Treatment?
- Source Protection
- Safety
- Emergency Response Plan and call list



Cross Connection / Backflow Prevention

- Cross connection : any situation where non-potable water can mix with potable water
- Hose bibs
- Various backflow prevention devices/practices
 - Check valves, RPZ, hose bib, double-check
 - Air gap



Cross Connections Conditions

- Do possible cross connections exist in any part of the system.
- Highly recommend the use of hose bib backflow preventers.



Pipe Size

- A pipe line that is too small can create back flow and back siphoning condition when too many people are using it at one time ...
- AWWA Standard is 20 PSI under all conditions



Chlorination and Disinfection (General Maintenance)

- When
- Why
- How



When

- After construction
- After repairs
- Bacteria hit
- Before opening and closing for season
- Annually as good practice



Why

- To kill bacteria that may cause illness



How

- 5 to 40 ppm chlorination
- Use liquid or solid chlorine
- MCL for chlorine is 4 ppm
- Will go over shock chlorination procedure later



Review of Actions Prior to Disinfection

- Inspect condition of system components
- Flush the system including;
 - source
 - storage tanks
 - distribution system



Shock Chlorination Procedure

- Determine volume to disinfect.
- Determine concentration and type of chlorine to use.
 - If relatively clean, 5 parts per million (ppm) can be used.
 - If stronger contamination is expected may require dose of 50 PPM or higher.



Determining Volumes in Storage

- 6" diameter well holds 15 gallons/ 10 feet.
- Math calculation required on storage tanks.
- $(D)^2 \times (.785) \times H = \text{Volume ft}^3 \times 7.48 \text{ gals/ft}^3$
=volume in gallons in tank
- Volume in distribution.
 - 1" I.D. 4 gallons/100 feet.
 - 2" I.D. 17 gallons/100 feet.



Determining Disinfection Contact Time

- More contact time the more assured the bacteria kill.
- 5 - 50 ppm for 18 to 24 hours.
- During disinfection water is non- potable, notify customers, if at this step should be on boil already or may be getting ready to serve water to customer.



Chlorine Concentrations

- 1.6 ounce of bleach (5.25%) to 100 gallons = 5 ppm.
- 16 ounces of bleach to 100 gallons = 50 ppm.
- 1 ounce of HTH (pool shock) to 100 gallons = 50 ppm.



Apply Principles to Individual Components

- Quick example if cleaning source
 - If disinfecting 300 gallons, using 50 ppm.
 - need 3 pints of 5.25 % bleach.



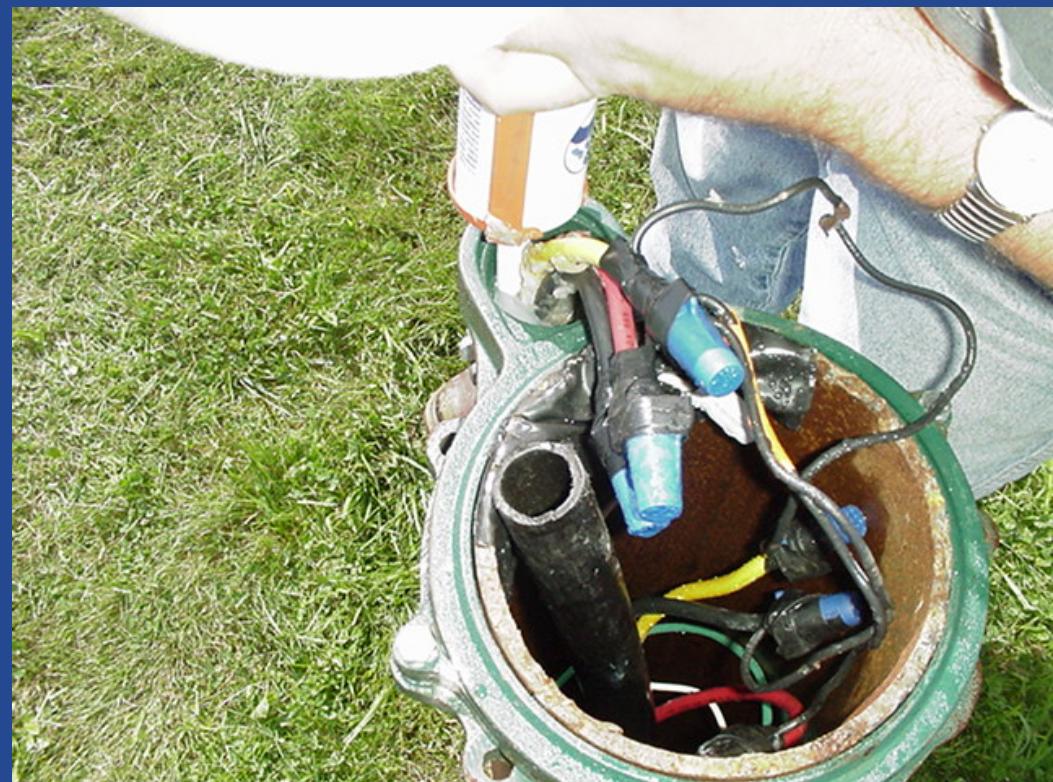
Adding Disinfectant to Source

- Bleach will not settle below 200 feet of water column
- Also need to consider well pumping rate when figuring volume and for flushing
- Wear safety goggles and gloves when handling chemicals



Use of Conduit to Bypass Electrical Connections

■ Safety Issues



Recirculation back to well

- Wait for chlorine smell
- Let stand 18-24 hr



Completing the Procedure

- Important to flush to waste following contact time.
- Avoid running chlorinated water into septic system.
- Do not discharge into open waters, violation of State and EPA standards.
- Perform bacteria testing to ensure coliform is absent five or 10 days after procedure.



Maintenance Shutdown Procedures

- Drain unused lines/tanks/pumps, etc.
- Most procedures are to prevent freeze up of system components, but it is important to be as sanitary as possible.
- Blow water from lines
- Plug or screen distribution lines
- Any isolation procedures, only certain parts of system shutdown
- Shock chlorinate the system



Contact:

Donny Boynton

Granite State Rural Water Association

Phone: (603) 753-4055

Email: dboynton@gsrwa.com

Website: www.gsrwa.com

